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A theory of impact philanthropy

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Abstract

This article develops a new model of altruism called impact philanthropy. An impact philanthropist is someone who wants to personally ‘make a difference.’ While that motive is straightforward, its logical implications are significantly different from other models of philanthropy. For example, the contributions of other donors can reduce an impact philanthropist’s charitable fulfillment. As a result, cooperation among impact philanthropists can reduce aggregate giving. In addition, impact philanthropy can lead to a codependent relationship between givers and receivers in which both benefit from the other. Finally, the model suggests a conflict between charitable organizations and its donors concerning the allocation of charitable gifts. In particular, a charitable organization prefers to spread a donor’s contribution across many goods, whereas a donor prefers to target his or her contribution at a specific good.

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1. Introduction

In the charitable contributions literature, economists motivate philanthropy using two distinct yet equally believable models: the public goods model in which donors give motivated by what their gifts accomplish, and the private consumption model in which donors give motivated by how giving makes them feel. This article develops a third philanthropic motivation called impact philanthropy. Impact philanthropists give moti-

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vated by their desire to personally 'make a difference.' While that motive is straightforward, it leads to distinct predictions regarding the interdependence of charitable gifts, the effect government programs have on private giving, the effectiveness of various fundraising strategies, and the relationship between a charitable organization and its donors.

Impact philanthropy predicts distinct philanthropic behavior because it implies that charitable giving can be interrelated in ways different than in other models of philanthropy. For example, the defining assumption of the public goods model is that donors contribute motivated by their desire to consume a public good.[1] The gifts of individual philanthropists are, therefore, related; anything that one philanthropist does to increase the supply of the public good is enjoyed by all. As a result, a public goods philanthropist prefers to 'free-ride' off the gifts of others, that is, enjoy the supply of the public good without having to pay for it. On the other hand, the defining assumption of the private consumption model is that donors contribute motivated by the personal satisfaction the act of giving itself brings, or equivalently, because the act of giving alleviates social guilt.[2] The private consumption model, coined 'warm-glow' by Andreoni (1990), does not imply that the gifts of individual philanthropists are related; one philanthropist's gift does not necessarily affect the enjoyment others receive from giving. Consequently, a warm-glow philanthropist cannot free-ride off of the gifts of others. Finally, the defining assumption of the impact philanthropy model is that donors contribute because they enjoy personally increasing the output of a good. Similar to public good philanthropists, the gifts of impact philanthropists are related, but in an opposite way; anything that one philanthropist does to increase the supply of the good reduces the impact of other philanthropists' contributions. Thus, rather than free-riding off the gifts of others, or being unaffected by them, giving by others can reduce an impact philanthropist's charitable fulfillment—an impact philanthropist cannot enjoy saving children if other philanthropists save them first.

The public goods model assumes that philanthropists receive utility from the level of a good, and then derive behavior regarding changes. The impact philanthropy model is different in that it assumes that philanthropists receive utility from changes directly. Both are plausible philanthropic assumptions, as is the warm-glow's assumption that philanthropists receive utility from the sheer size of a gift. The reasonableness of its assumption notwithstanding, impact philanthropy, because it implies negative gift externalities, suggests some seemingly unphilanthropic behavior. To identify and understand that behavior, this article develops a model of pure impact philanthropy. In the end, however, it would be unreasonable to assume that a philanthropist has a single motive for giving. Rather, philanthropists likely care, to varying degrees, about the size, impact, and end result of their gifts.

The seemingly unphilanthropic behavior displayed by pure impact philanthropists stems from the model's negative gift externalities. If the production of a good exhibits increasing marginal cost, then increasing its supply increases the cost of impact philanthropy. Thus, giving by others can make an impact philanthropist feel worse off. Previous models of philanthropy suggest that the contributions of others will have either no effect (as in the warm-glow model) or will benefit a philanthropist (as in the public goods model). Furthermore, because of gift externalities, both the public good and impact philanthropy models predict that voluntary contributions will not generally lead to Pareto optimal giving. As failing to account for a positive gift externality leads public good philanthropists to contribute too little, failing to account for a negative gift externality can lead impact philanthropists to contribute too much.

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[1] See Warr (1982); Roberts (1984); and Bergstrom et al. (1986).

[2] See Menchik and Weisbrod (1981).

The reversal of gift interdependencies also implies that impact philanthropists and public good philanthropists will respond differently to government programs. For example, the public goods model predicts that government support of a public good can crowd-out private donations to that good, dollar-for-dollar. However, even with interior solutions, dollar-for-dollar crowd-out is not possible among impact philanthropists and, in fact, government spending might crowd-in donations.

When the good that a philanthropist finances is a person rather than a production process, valuing the impact of one's gift can affect the relationship between the donor and recipient. For example, consider a situation in which a philanthropist cares about the well being of a group of needy children. A public good philanthropist would rather see the children become self sufficient because then he or she would enjoy the higher welfare of the children without having to pay for it. Ironically, the children themselves may be more likely to remain dependent because of the philanthropist's altruism. That donor–recipient relationship is called the Samaritan's dilemma (see Buchanan, 1975). However, being a Samaritan is not a dilemma for an impact philanthropist. A pure impact philanthropist, because he or she enjoys personally helping children, may actually benefit from need—an impact philanthropist cannot enjoy saving children if the children save themselves. Thus, an impact philanthropist may fall into a codependent relationship with recipients in which the recipients remain dependent on philanthropy.

Finally, impact philanthropy can explain why donors often prefer to fund a specific part of a production process, such as refusing to pay for overhead costs or preferring to sponsor an individual child rather than a children's organization. For example, suppose that a children's organization uses charitable donations to feed 1000 needy children. To an individual contributor, is saving a single child from starvation more satisfying than providing each with a single grain of rice? Is paying for the food the children eat more satisfying than paying the salary of the charitable organization's administrators? For a public goods philanthropist, the answer to both questions is no. In fact, as long as the charitable organization maximizes the supply of the public good, a public goods philanthropist is indifferent to how it specifically uses his or her contribution. However, an impact philanthropist can perceive a greater impact by targeting his or her gift at a specific part of the production process. For example, sponsoring an individual child can increase a philanthropist's perceived impact because he or she gives the first, as well as the last, dollar to the child. Thus, targeting contributions can benefit an impact philanthropist. However, when a charitable organization accommodates the wishes of its donors, total contributions can fall. In fact, a fundraising policy that maximizes the philanthropists' perceived impact is inconsistent with one that maximizes total contributions.

2. Modeling the consumption of charity

In the sections that follow, this article examines impact philanthropy in three settings. The first setting has an individual donor financing a single charitable good, and it is analogous to the person-to-person transfer-of-wealth model. In that setting, impact philanthropy can lead to a codependent relationship in which neither the donor nor the recipient has any interest in seeing the recipient become self-sufficient. The second setting has several donors financing a single charitable good, and it is analogous to the classic public goods model.[3] Similar to a public goods philanthropist, an impact philanthropist fails to account for how his or her gift affects other donors. However, because giving by one philanthropist can reduce the utility of others, that failure leads impact philanthropists to contribute more than the Pareto optimal amount.[4] The final setting has several donors financing several substitutable goods. As in the single good setting, impact philanthropists will generally contribute more than the Pareto optimal amount. However, a group of impact philanthropists can contribute optimally if they allocate their donations so that no two donors contribute to the same good. While donors favor a targeted-gift allocation, a charitable organization will be reluctant to lead its donors to it because total contributions may fall.

3. One philanthropist, one good

Initially, suppose that there is one donor, one charitable good, and no government transfers. Two sources finance the production of the charitable good: an endowment (e) and contributions from the donor (g). Let $Z(y)$ represent the production function, where $y = e + g$, $Z' > 0$ and $Z'' < 0$. If the donor contributes to the good, then something about contributing must bring the donor utility. Exactly what that is defines the philanthropist. For example, a public goods philanthropist values the total supply of the good and, thus, his or her utility function is written as $V(w - g, Z(y))$, where w represents the donor's endowed wealth.[5] An increase in the good's endowment (e) always makes a public goods philanthropist better off, because afterwards he or she can maintain the same private wealth while increasing the supply of the good or vice-versa.

In contrast, a warm-glow philanthropist values the act of giving and, thus, his or her utility is $V(w - g, g)$. The resulting supply of good Z is irrelevant, meaning that an increase in its endowment has no effect on a warm-glow philanthropist.[6] One interpretation of warm-glow utility is to say that the donor cares only about giving a gift, not what is actually done with it. Thought of in that way, it would not matter to the donor if his or her gift got lost in the mail, because he or she values the act of giving, not its results. However, that is not the only way one can interpret warm-glow. A gift given is also a gift received. For example, suppose that the good the philanthropist finances is the welfare of a needy child. If the spirit of warm-glow is that a donor enjoys personally helping a child, then perhaps g better represents how much the donor personally increased the child's wealth. Thought of in that way, it would matter to a warm-glow philanthropist if his or her gift got lost in the mail, because then he or she would not actually be helping the child. However, if that is the spirit of warm-glow, then adding g to the donor's utility function may not appropriately capture that spirit. A donor who enjoys helping a child should care how much his or her gift increases the child's welfare, not how much it increases the child's wealth. Similarly, in general, a donor who enjoys impacting a good should care about how his or her gift impacts the supply of that good (i.e., Z), not how it impacts expenditures on that good (i.e., y).

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[3] The actual supply of the public good does not enter into a pure impact philanthropist's utility function, and so it is not, technically, a public good.

[4] 'Pareto optimal' means optimal for donors, not necessarily for recipients or society.

[5] Admittedly, one philanthropist and one public good is a contradiction of terms: a good cannot be non-rival and non-excludable if there are no rivals and no one to exclude. However, in anticipation of applying the model to a situation with many donors, this section refers to a public good philanthropist as someone who values the total supply of the good.

[6] Andreoni (1990) develops an 'impure altruist' model, writing the donor's utility as $V(w - g,\ e + g,\ g)$. However, like the public goods model, the impure altruist model suggests that an increase in the supply of the public good will make the donor better off.

Of course, the difference between increasing Z and increasing y is only relevant when Z is nonlinear, such as when its production exhibits increasing marginal cost. In that case, when a donor enjoys personally impacting the supply of Z, his or her utility is written $V(w-g,\delta)$, where $\delta = Z(e+g) - Z(e)$. When Z is concave, increasing its endowment (e) reduces a gift's impact (δ) and thus reduces an impact philanthropist's charitable fulfillment. For example, increasing a child's endowed wealth can change the importance of a donor's gift, from saving the child from starvation to buying the child an extra toy. As a result, donors who want to 'make a difference' can actually benefit from need: the greater the need, the greater the impact. Therefore, to the extent that a philanthropist cares about his or her impact, he or she can fall into a codependent relationship with recipients in which both benefit from the other.

3.1. Codependence and the Samaritan's dilemma

The term codependence has several meanings.[7] This article uses the term to describe a relationship that can develop between an impact philanthropist and the recipient of philanthropy, particularly when the recipient is also a decision-maker. An impact philanthropist can benefit from need. Anything that reduces the need for contributions, for example, a child lifting him or herself out of poverty or a charitable organization soliciting funds from other sources, has the potential to hurt an impact philanthropist. While the recipients of philanthropy have no interest in keeping their endowments low, they also know that any attempt to increase funding from other sources can result in smaller gifts from the donor. Incorporating the effort of recipients into the public goods model leads to the Samaritan's dilemma.[8] The dilemma for a public goods philanthropist is that if the recipient internalizes the philanthropist's altruism, then he or she will exert less effort, increasing the need for the donor's altruism. The same relationship can exist between recipients and impact philanthropists; however, because an impact philanthropist benefits from need, he or she would not see it as a dilemma, but rather as an optimal codependent relationship.[9]

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[7] Beattie (1996) defines a codependent person as, "one who has let another person's behavior affect him or her, and who is obsessed with controlling that person's behavior."

[8] See Buchanan (1975); Bruce and Waldman (1991).

3.2. Linear altruism

In models of person-to-person transfers of wealth, authors often specify a quasi-linear utility function of the form $V = U(w-g) + \alpha Z(e+g)$, where α represents the altruistic parameter.[10] This article does not assume that a donor's utility is linear in impact; however, the implications of such an assumption are worth investigating. If the impact philanthropist's utility is linear in impact, then his or her utility function is:

$$V = U(w-g) + \alpha Z(e+g) - \alpha Z(e). \tag{1}$$

Notice that the last term on the right-hand side of (1) represents an exogenous subtraction from the donor's utility, and thus, omitting it will not change the donor's utility-maximizing gift. Furthermore, omitting the last term in (1) reduces the equation to the public goods model with quasi-linear utility. Therefore, (1) nests the public goods model. Alternatively, if Z is linear, then the calculation of impact becomes:

$$\delta = \beta(e+g) - \beta(e) = \beta g. \tag{2}$$

Thus, when Z is linear, the impact philanthropy model is equivalent to the warm-glow model, and when f is linear, it is equivalent to the public goods model.

3.3. Responding to a change in need

Although benefiting from need, how a pure impact philanthropist will respond to a change in need is uncertain. Not all impact philanthropists will necessarily become codependent. In a situation with only one donor and one good, a change in need can come either from a change in the good's endowment or from a change in government policy. For example, let t represent a lump-sum tax the government takes from the donor and gives to the production of Z. The impact philanthropist's utility function becomes:

$$V = U(w-g-t) + f(\delta), \tag{3}$$

where $\delta = Z(e+t+g) - Z(e+t)$. By assumption, the utility components U and f are increasing and strictly concave functions.[11] The assumption embodied in (3) is that, although the donor finances government spending, he or she does not consider it as part of his or her impact. Thus, the only difference between increasing t and increasing e is that the donor finances the former but not the latter.

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[9] Being a Samaritan is not a dilemma for impact philanthropists, and so it would not justify the use of tied transfers as it does in public good model (see Bruce and Waldman, 1991). However, an impact philanthropist might use tied transfers if he or she felt it increased the impact of his or her gift.

[10] See, for example, Kaplow (1995).

[11] The donor's preferences are represented by an additive utility function for illustrative purposes only. All the conclusions derived in this article generalize to the case of general preferences.

First, consider how a change in e affects the impact philanthropist. As e increases so, too, does the marginal cost of Z. As the cost of impact goes up, the donor will buy less impact. However, buying less does not imply spending less. While an impact philanthropist cares about impact (δ), charitable organizations care about donations (g). To derive the effect a change in e has on g, write the first-order condition for an interior solution to choosing g that maximizes (3) as:[12]

$$h(w,e,t) = -U'\ (w-g-t) + f'\ (\delta)Z'\ (e+g+t) = 0. \tag{4}$$

Let $g^*(w,e,t)$ represent the donor's gift that solves (4). Substituting $g^*(w,e,t)$ into (4) yields the identity,

$$h(g^*(w,e,t),w,e,t) \equiv 0. \tag{5}$$

Differentiating (5) with respect to e and collecting terms yields,

$$\frac{\partial g^*}{\partial e} = \frac{Z'\,f''\,\bar{Z}' + U''}{Z'\,f''\,Z' + U'' + f'\,Z''} - 1, \tag{6}$$

where $Z' = \partial Z(e+t+g^*)/\partial(e+t)$, $\bar{Z}' = Z(e+t)\big/\ \partial(e+t)$, $Z'' = \partial Z(e+t+g^*)/\partial^2(e+t)$, $f' = \partial f/\partial(e+t)$, $f'' = \partial f\big/\partial^2(e+t)$, $U'' = \partial U\big/\partial^2(e+t)$. Note that $\bar{Z}'$ and Z' represent the marginal product of Z before and after receiving the donor's gift. The first term on the right-hand side of (6) is positive. If $Z''=0$, then impact philanthropy is equivalent to warm-glow, and (6) reduces to $\partial g^*/\partial e = 0$. However, if $f''<0$ and $C''<0$, then $\partial g^*/\partial e > -1$. It is, therefore, possible that an impact philanthropist will respond to an increase in the good's endowment by spending more on donations (g) while buying less impact (δ). In particular, when $Z'\,f''\,(\bar{Z}' - Z') > f'Z''$.

Next, consider how a change in t affects the impact philanthropist. It is well established that, in the public goods model, government spending will crowd-out private donations dollar for dollar (see Bergstrom et al., 1986). The two caveats to that prediction are that the government does not tax any individual more than his or her original contribution and that the government spends the entire tax revenue on the public good. The impure altruist model predicts partial crowd-out, although perfect crowd-out is possible under strict assumptions (see Andreoni, 1990). By contrast, the impact philanthropy model predicts that perfect crowd-out is not possible and that government spending may, in fact, crowd-in private donations. Differentiating (5) with respect to t and collecting terms yields,

$$\frac{\partial g^*}{\partial t} = \frac{Z'\,f''\,\bar{Z}'}{Z'\,f''\,Z' + U'' + f'\,Z''} - 1. \tag{7}$$

The only difference between (6) and (7) is that U'' is missing from the numerator of (7). If $f''=0$, then the impact philanthropy model reduces to the public goods model and (7) becomes $\partial g^*/\partial t = -1$. That establishes the perfect crowding-out of the public goods model. However, if $f'' < 0$ and $Z'' < 0$, then $\partial g^*/\partial t > -1$, and perfect crowd-out is not possible. On the other hand, crowd-in is possible. When the government increases t it, by definition, increases the price of impact philanthropy. As a result, an impact philanthropist will buy less impact (δ), but may end up spending more on donations (g).

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[12] The analysis in this section assumes an interior solution. This assumption is maintained when the model is generalized to the n donor case. Considering boundary conditions does not add substantively to the discussion of an impact philanthropist's behavior.

4. *n* philanthropists, one good

The previous one-donor, one-child model illustrates that increasing the initial supply of the charitable good reduces a gift's impact. While government spending is one way to increase the supply of the good, giving by other philanthropists is another. To illustrate that point, suppose that n philanthropists can contribute to good Z, ignoring government transfers. Let g_i represent donor i's gift to good Z, $G = \sum_i g_i$ represent the total amount contributed by all donors, and $G_{-i} = G - g_i$ represent the amount contributed by all donors except i. Donor i's utility function is:

$$V_i = U_i(w_i - g_i) + f_i(\delta_i), \tag{8}$$

where $\delta_i = Z(e + G) - Z(e + G_{-i})$. Applying the Nash assumption, the first-order condition for an interior solution to choosing g_i that maximizes (8) is:

$$U_i'\ (w_i - g_i) = f_i'(\delta_i)Z'(e + G). \tag{9}$$

Let $g^* = \{g_1{}^*, \ldots, g_n{}^*\}$ represent a Nash equilibrium gift allocation that solves (9).

Giving by others affects impact philanthropists and public good philanthropists in opposite ways.[13] For an impact philanthropist, the gifts of other philanthropists enter (8) same way as the good's endowment. Therefore,

$$\frac{\partial V_i}{\partial e} = \frac{\partial V_i}{\partial G_{-i}} < 0, \tag{10}$$

whenever $g_i > 0$. Increasing the gifts of others makes donor i worse off, *ceteris paribus*, because it reduces the influence of his or her gift.

4.1. Calculating a gift's impact

According to (8), a donor calculates his or her impact as the change in the supply of a good resulting from his or her gift, holding constant the gifts of others. That is a familiar assumption in a simultaneous game. However, the impact philanthropy model embeds that assumption in the donor's utility function. Being that utility is a theoretical concept, could, in a simultaneous game, a donor calculate his or her impact as the change in the equilibrium supply of a good resulting from his or her gift? Calculating impact, accounting for the changing gifts of others, might increase or decrease a donor's perceived impact (a decrease in need can lead other impact philanthropists to give less or more). However, the concept of impact philanthropy is more general than the specific calculation of impact given by (8). In fact, the implications of impact philanthropy hold under any alternative calculation of impact, provided that a philanthropist values impact, and that he or she calculates a smaller impact as others give more. Other examples of impact philanthropists include donors who value size of their gifts *relative* to the gifts of their peers. In a model closely related to impact philanthropy, Harbaugh (1998) develops a type of philanthropy based on prestige in which donors give motivated by the public recognition their contributions bring.[14] In Harbaugh's model, the prestige one philanthropist receives from being identified as a donor is unaffected by how many other donors are also identified. However, Andreoni and Petrie (2000) extend Harbaugh's model to one of *relative* prestige or social comparison. Social comparison—I want to be more generous than you—is a type of impact philanthropy and, as such, can lead to negative gift externalities.

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[13] Impact philanthropists and public good philanthropists have, by definition, different utility functions. There is, therefore, no way to tell, *a priori*, which type of philanthropy would lead to more giving.

4.2. Cooperation among donors

Without cooperation, public good philanthropists will give too little because each only considers how his or her gift enters his or her own utility function. Impact philanthropists do the same thing. However, while public good philanthropists ignore a positive externality, impact philanthropists ignore a negative externality. Consequently, cooperation among impact philanthropists can reduce total giving. For example, assume for simplicity an aggregate welfare function that is sum of the donor's utility:

$$S = \sum_i U_i(w_i - g_i) + \sum_i f_i(\delta_i), \tag{11}$$

where $\delta_i = Z(e+G) - Z(e+G_{-i})$. The first-order condition for an interior solution to choosing donor gifts that maximizes (11) is:

$$U_i'(w_i - g_i) = f_i'(\delta_i)Z'(e+G) + \sum_{k \neq i}^{n} f_k'(\delta_k)(Z'(e+G) - Z'(e+G_{-k})). \tag{12}$$

Let $\boldsymbol{g}^s = \{g_1^s, \ldots, g_n^s\}$ represent a gift allocation that solves (12) and $G^s = \sum_i g_i^s$.

Proposition 1. *When a group of impact philanthropists finance a single good through voluntarily contributions, total contributions will be greater than Pareto optimal.*[15]

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[14] In Harbaugh's model, charitable organizations create gift categories and then publicly disclose who contributed in each category. For example, an opera house might list a donor as a 'Patron' or a 'Founder' depending on how much the donor contributes.

[15] In the context of Proposition 1, as well as throughout this article, Pareto optimal means optimal for donors. The purpose of discussing Pareto optimal giving is to explore issues of cooperation from an impact philanthropist's point of view, not from society's point of view. When the good a philanthropist finances is a recipient's welfare, it may be appropriate to include the recipient's welfare in a social welfare function. However, (11) is not the social welfare function, but rather is the donors' welfare function. Section 6 considers the case of a charitable organization concerned with maximizing the supply of the good (or, equivalently, the welfare of the children).

Proof. See Appendix A. □

The donors' aggregate welfare function (11) double-counts (or n-counts, as the case may be) each philanthropist's gift, once as it enters the utility function of the donor who gave it, and then again, as it enters the utility function of other donors. An individual donor counts his or her gift only once. Stiglitz (1987) shows that double counting leads public goods philanthropists to contribute more when they cooperate. Conversely, double counting leads impact philanthropists to contribute less when they cooperate.

5. *n* philanthropists, *m* goods

The most general situation an impact philanthropist can find him or herself in is one with many philanthropists financing many different goods. The point derived from this situation is not that impact philanthropists prefer to target their donations at their *favorite* goods—for that is true in any model—but rather that they prefer to target their donations even when they view the goods as perfect substitutes. For example, suppose that n donors finance the production of m perfectly substitutable charitable goods. Expanding on the previous notation, let g_{ij} represent donor i's contribution to good j. The total contributed to good j is $G_j = \sum_i g_{ij}$. Aggregate production—which a public good philanthropist values and an impact philanthropist wants to impact—is defined as:

$$\Psi = \sum_{j=1}^{m} Z_j(e_j + G_j). \tag{13}$$

Let $G_{-ij} = G_j - g_{ij}$ represent the total contributions to good j from all donors except i. The impact philanthropist's utility function (8) becomes:

$$V_i = U_i\left(w_i - \sum_j g_{ij}\right) + f_i(\delta_i), \tag{14}$$

where $\delta_i = \sum_j (Z_j(e_j + G_j) - Z_j(e_j + G_{-ij}))$. Likewise, the first-order condition (9) becomes a set of m conditions:

$$U_i'\left(w_i - \sum_j g_{ij}\right) = f_i'(\delta_i) Z_j'(e_j + G_j), \text{ for } j = 1, \ldots, m. \tag{15}$$

Impact philanthropists behave similar to public good philanthropists in that both will choose to contribute to the good with the highest marginal product, and thus, in equilibrium, all goods that receive donations will have equal marginal product. Manipulating (15) verifies that result. Let $\boldsymbol{g}* = \{g_{ij}^*\}$ represent a Nash equilibrium gift allocation that solves (15) and $G_j^* = \sum_i g_{ij}^*$. Plugging G_j^* into (15) and rearranging terms yields a necessary condition for a Nash equilibrium:

$$Z_j'(e_j + G_j^*) = Z_k'(e_k + G_k^*), \ \forall j, k. \tag{16}$$

Thus, although it will be shown that an impact philanthropist prefers to target his or her contribution at a specific good, that will not necessarily happen at a Nash equilibrium. Targeting gifts requires coordination among donors. If other donors divide their gifts equally among the goods, then an impact philanthropist will do the same.

As was the case with many donors and one good, a Nash equilibrium derived by (15) will not generally be Pareto optimal for donors. However, the Nash equilibrium can be Pareto optimal in a special case. With n philanthropists and m public goods, the first-order condition from the donors' aggregate welfare problem (12) becomes a set of m conditions:

$$\begin{aligned} U_i'\left(w_i - \sum_j g_{ij}\right) &= f_i'(\delta_i) Z_j'(e_j + G_j) \\ &+ \sum_{k \neq i}^{n} f_k'(\delta_k)(Z_j'(e_j + G_j) - Z_j'(e_j + G_{-ik})) \text{ for } j = 1, \ldots, m. \end{aligned} \tag{17}$$

The first-order conditions (15) and (17) differ by the last term on the right-hand side of (17), which is negative whenever at least two donors contribute to the same good, and zero otherwise. When there are more donors than goods, a Nash equilibrium cannot be Pareto optimal. However, when there are fewer donors than goods, it may be feasible to allocate donations such that no two donors give to the same good. Specifically, such an allocation would be feasible if $n = \lambda m$ where λ is a positive integer. Allocating donations in that way may or may not solve (15), and thus, may or may not be a Nash equilibrium. However, if such a target allocation does solve (15), it solves (17) by definition.

Proposition 2. *Any Nash equilibrium gift allocation in which no two donors contribute to the same good is Pareto optimal for donors.*

Proof. See Appendix A. □

Among a group of impact philanthropists, a Nash equilibrium can be Pareto optimal. However, that situation can only exist under the right conditions. For example, a Pareto optimal Nash equilibrium can never exist when there are more donors than charitable goods. However, provided that there are at least as many goods as donors, the Pareto optimal allocation will have no two donors give to the same good, and can also be a Nash equilibrium.

5.1. Targeting contributions at a specific good

Regardless of the ratio of donors to charitable goods, a group of impact philanthropists can generally increase their utility through cooperation. Of course, impact philanthropists

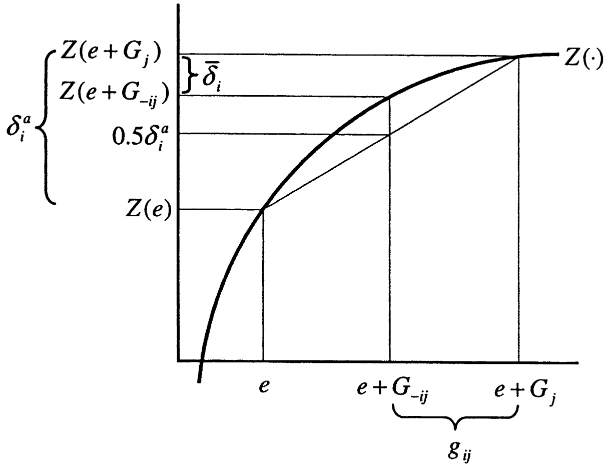

Fig. 1. Targeting gifts benefits an impact philanthropist.

face the same prisoner's dilemma problem that public good philanthropists face. However, impact philanthropists may be able to overcome the prisoner's dilemma by colluding in a way not useful to public good philanthropists.

Each impact philanthropist views him or herself as contributing the last dollar to the production of a good. That is a problem because the last dollar given has the least impact. Impact philanthropists can avoid that problem by agreeing, not on how much to give, but where to give it. For example, consider a situation with two philanthropists and two charitable goods. Is it better for both philanthropists to support both goods or for each to support only one good? No matter how much the philanthropists decide to give in total, they can always increase their utility by targeting their gifts rather than spreading them around. For example, Fig. 1 diagrams one good's production function. For simplicity, suppose that both donors decide to give the same total gift, but must decide how to allocate their gifts between the two goods. If the donors spread their gifts evenly between the two goods, then each donor's perceived impact on the production of the good diagrammed in Fig. 1 would be $\bar{\delta}_i$, meaning that each donor's total impact would be $2\bar{\delta}_i$. On the other hand, if donors target their gifts—each supporting a different good—then each donor's total impact would be δ_i^a. Furthermore, because the production function is concave, $\delta_i^a > 2\bar{\delta}_i$. The same total gift has a greater perceived impact when donors target their gifts. If there are at least two donors and two goods, similar Pareto-improving agreements exist regardless of the ratio of donors to goods.[16] In fact, from an impact philanthropist's point of view, spreading gifts evenly across goods is the worst possible way to allocate gifts.

Proposition 3. *Let* $\bar{g}=\{\bar{g}_{ij}\}$, *where* $\bar{g}_{ij}=(\sum_j \bar{g}_{ij})/m \; \forall i$, *represent an allocation in which each donor spreads his or her gift evenly across the charitable goods. Any different gift*

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[16] For example, two donors giving equally to three goods can increase their utility by each targeting one good while giving equally to the third. Three donors giving equally to two goods can increase their utility if two target their donations at a different good.

allocation $\tilde{\boldsymbol{g}} = \{\tilde{g}_{ij}\}$ *in which each donor gives the same total gift (i.e.,* $\Sigma_j \tilde{g}_{ij} = \Sigma_j \bar{g}_{ij} \forall i$*), and each good receives the same total gift (i.e.,* $\tilde{G}_j = \bar{G}_j \forall j$*), is Pareto superior to* $\bar{\boldsymbol{g}}$*.*

Proof. See Appendix A. □

From the philanthropist's point of view, among allocations equivalent in each donor's total gift as well as in the supply of each charitable good, spreading gifts evenly across goods is the worst possible way to allocate gifts because it minimizes each donor's perceived impact. That is a unique result of impact philanthropy. For instance, public good philanthropists are indifferent between the allocations $\tilde{\boldsymbol{g}}$ and $\bar{\boldsymbol{g}}$. When a public good philanthropist finances perfectly substitutable charitable goods, he or she does not care which specific good receives his or her gift, provided that the gifts are allocated efficiently, as defined by (16). Proposition 3 does not stipulate that either $\bar{\boldsymbol{g}}$ or $\tilde{\boldsymbol{g}}$ is a Nash equilibrium. However, for a group of public goods philanthropists, if $\bar{\boldsymbol{g}}$ is a Nash equilibrium, then $\tilde{\boldsymbol{g}}$ is also. That is not true for impact philanthropists. In fact, among a group of impact philanthropists, if $\bar{\boldsymbol{g}}$ is a Nash equilibrium, then $\tilde{\boldsymbol{g}}$ is not.

Proposition 4. *Let* $\bar{\boldsymbol{g}}^* = \{\bar{g}_{ij}^*\}$*, where* $\bar{g}_{ij}^* = (\Sigma_j \bar{g}_{ij}^*)/m \; \forall i$*, be a Nash equilibrium gift allocation in which each donor spreads his or her gift evenly across the m goods. Any different gift allocation that gives the same total amount of money is not a Nash equilibrium.*

Proof. See Appendix A. □

Proposition 4 is another unique result of impact philanthropy. For public good philanthropists, warm-glow philanthropists, and impure altruists, two allocations are equivalent if, in both, each donor gives the same total gift and each good receives the same total gift. Which specific donor gives to what specific good is unimportant. Impact philanthropists, on the other hand, can make themselves better off by agreeing, not only how much to give, but also where to give it. Moreover, such an agreement need not necessarily be collusive, but it may be a Nash equilibrium.

5.2. Calculating a gift's impact, revisited

When many donors finance many goods, the benefit from targeting donations can depend on how donors calculate impact. For example, if a donor calculates impact by incorporating the changing gifts of others, then targeting a gift may not increase his or her utility. Moreover, the same is true if the donor holds the gifts of others constant, but not the allocation of those gifts to the various charitable goods. Take, for example, the common fundraising practice of sponsoring children. If money is fungible, do donors really believe that the charitable organization would have let the sponsored child starve but for the donor's contribution? In fact, that is not what impact philanthropy implies. Even if a donor is not so naïve as to believe that the charitable organization would have let the sponsored child starve, the donor is still the one who fed the child. Assuming that a donor enjoys being the one who personally helped a child does not imply that the donor was somehow fooled; only that gratitude follows the money. The child who sends letters of thanks to the sponsor is not likely to write, 'Thanks, but we both know that if you hadn't helped me someone else would have.' In that respect, impact philanthropy is more like warm-glow than pure altruism. Furthermore, the alternative seems less plausible. Fully incorporating the response of others when calculating a gift's impact suggests that a donor receives no pleasure from personally helping someone that would have been helped anyway.

5.3. Free riding and group size

Free riding in the public goods model predicts that, all else equal, average contributions to a public good will decrease as group size increases (Andreoni, 1988). That result is at odds with both the empirical facts about giving and experimental evidence. For example, Isaac and Walker (1988) and Isaac et al. (1994) conducted a series of public goods experiments in which they varied the number of players, holding constant other factors that influence giving, such as group income and the marginal return from contributing to the public good. They found that increasing group size increased average contributions.

The impact philanthropy model may help to explain some of Isaac and Walker's findings. Unlike a public goods philanthropist, a *pure* impact philanthropist cannot free ride off the gifts of others. Rather, giving by others increases the cost of impact philanthropy. However, targeting gifts can decrease the cost of impact philanthropy. In Isaac, Walker, and Williams's experiments, decreasing group size also implied targeting gifts at fewer recipients. As shown in the next section, if donors are homogeneous, then targeting gifts—or, equivalently, decreasing group size—can decrease total contributions.

5.4. An example with needy children and homogeneous donors

One example consistent with perfectly substitutable charitable goods may be the welfare of needy children. Suppose that a group of impact philanthropists enjoys impacting the welfare of a group of homogeneous children. What will happen to the welfare of the children if the donors decide to sponsor children? Compared to dividing each donor's gift equally among the children, an agreement among homogeneous donors to sponsor children will reduce aggregate giving. Moreover, such an agreement among donors can result in an allocation that is a Pareto optimal Nash equilibrium.

Proposition 5. *Given that donors are homogeneous,* $e_j = e_k \, \forall j, k$*, and* $n = \lambda m$ *where* λ *is a positive integer; let* $\bar{\mathbf{g}}^* = \{\bar{g}^*_{ij}\} \, \forall ij$ *be the symmetric Nash equilibrium gift allocation when each donor's contribution is divided equally among the m goods. Let* $\mathbf{g}^s = \{g^s_{ij}\} \, \forall ij$ *be the equilibrium gift allocation when each donor's contribution is targeted at* λ *goods, such that no two donors are allowed to contribute to the same good. Then:*

(a) *Total contributions at* $\mathbf{g}^s$ *will be smaller than at* $\bar{\mathbf{g}}^*$*;*
(b) *At* $\mathbf{g}^s$*, no donor will desire to cheat by contributing to goods other than his or her* λ *goods;*
(c) $\mathbf{g}^s$ *is Pareto optimal for donors.*

Proof. See Appendix A. □

Proposition 5 applies to the situation with homogeneous donors and an evenly divisible donor-to-child ratio. In that situation, sponsoring children will benefit the donors but harm the children.[17] However, Proposition 5 does not generalize to other situations. For example, when the donor-to-child ratio is not evenly dividable, two or more donors would have to contribute to the same child. That would preclude any Nash equilibrium from being Pareto optimal, and thus, part (c) would not hold. In that situation, however, sponsoring agreements in which parts (a) and (b) hold may still be feasible. In fact, regardless of the donor-to-child ratio, any *symmetric* sponsoring agreement among homogeneous donors in which, if every donor gave the same amount as in $\bar{\boldsymbol{g}}*$, then every child would receive the same amount as in $\bar{\boldsymbol{g}}*$, would (*i*) result in lower total contributions, (*ii*) leave donors without any desire to cheat, and (*iii*) benefit donors.[18] A symmetric sponsoring agreement is one in which if every homogeneous donor gave the same amount, then every donor would perceive the same impact (i.e., one that treats the identical donors identically). For example, the targeted allocation described in Proposition 5, $\boldsymbol{g}^s$, is a symmetric sponsoring agreement. If there are more donors than children, but λ is not an integer, then one possible symmetric sponsoring agreement would have each donor sponsor as many children as feasible (i.e., the integer part of n/m) while dividing additional contributions equally among the remaining children. By (16), every child, sponsored or not, would receive the same total contribution. The resulting equilibrium would be Pareto superior to $\bar{\boldsymbol{g}}*$, but would result in less total contributions. On the other hand, if there are fewer children than donors, then it is feasible to design a symmetric sponsoring agreement if n and m have a common factor. For example, if m and n are even numbers, then a possible symmetric sponsoring agreement would have the first half of donors contribute to the first half of the children and the second half of the donors contribute to the second half of children.[19]

As discussed above, Proposition 5 does generalize a bit. However, it does not generalize to the situation with heterogeneous donors. Heterogeneous donors allow for the possibility that different donors will contribute different amounts. In that case, sponsoring can increase or decrease total contributions. For example, one wealthy contributor dividing his or her large gift equally among the children can discourage others from giving, because additional gifts will have a small impact. Forcing the wealthy contributor to sponsor a subset of children will lower the cost of impact for the remaining donors, which can encourage them to give more. Of course, the wealthy contributor may give less, potentially offsetting the increases from the other donors. In addition, while sponsoring children may be able to increase the utility of heterogeneous donors, donors who give more would have an incentive to cheat by contributing to other donors' children. Thus, heterogeneous donors may find it difficult to maintain a sponsoring agreement without some way to enforce it.

6. Implications for charitable organizations

Charitable organizations may help enforce sponsoring agreements. Save the Children, Feed the Children, Global Care, and Compassion International are some of the better-known programs that promote sponsoring of children.[20] Many of those programs aid children living in underdeveloped countries; however, a donor can sponsor a child in almost any country and for a variety of needs, including nutrition, education, medical, or simply to buy the child a birthday or Christmas present.[21] For example, at Compassion International's web site, potential donors can click on the photograph of the child he or she wishes to sponsor and, for $28 a month, he or she will receive pictures, personal information, and at least three letters a year from the child. Organizations typically encourage donors to send their sponsored child extra gifts for special occasions or as the need of the child changes.

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[17] Section 6 discusses several reasons why a charitable organization might offer sponsoring.

[18] That result can be established using the same logic that proves Proposition 5.

[19] An example of a non-symmetric sponsoring agreement would have m of the n donors each sponsor one child, while the remaining $n-m$ donors would split their contributions equally among all children.

6.1. Why would a charitable organization offer sponsoring?

If sponsoring children reduces charitable contributions, then why would a charity offer that option? First, sponsoring children may not reduce total contributions if donors are heterogeneous. Second, charitable organizations compete for donations. If monopolistic firms earn higher profit than competitive firms do, then why do firms compete? It is not because they want to compete, but rather because they have to. Similarly, charitable organizations may be non-profit, but they compete for donors in the same way for-profit firms compete for customers. Even charitable organization with seemingly unrelated missions may bid for the same charitable dollar. Just as competition forces a firm into lowering its price to attract customers, it may force a charity into sponsoring children to attract donors. As a result, non-profit firms may use sponsoring children, as some do memberships, as a type of loss leader—a way to attract, collect information, and form relationships with donors. Once a donor is familiar with an organization, and is at the optimal point in his or her charitable lifecycle, fundraisers solicit larger general-use grants.

Of course, if a charity is a monopoly, then it can allocate donations to maximize the supply of the good. In fact, impact philanthropy provides a rationale for several small charities to merge into one large charity. By merging, small charities can spread contributions over several goods, which can increase total donations. Of course, merging diverse charities is less likely to increase total donations. Bilodeau (1992) and Bilodeau and Slivinski (1997) derive models in which charitable organizations provide bundles of public goods financed by donors with heterogeneous preferences. In their models, each donor has his or her favorite public good. They show that equilibrium contributions diminish when the charity produces diverse public goods. Merging charities that produce diverse goods will have a similar influence on impact philanthropists. Therefore, with heterogeneous preferences, a charitable merger is more likely to increase charitable donations when the merging charities produce similar goods.

6.2. Monitoring charitable organizations and overhead costs

The details of the sponsoring agreements offered by charitable organizations seem consistent with the motives of impact philanthropists, while inconsistent with the motives of public goods philanthropists. First, sponsoring children increases overhead costs, and so it increases the price of the public good. Second, with sponsoring, different children will receive different levels of assistance, a fact that, to a public goods philanthropist, will lead to an inefficient allocation of funds. Finally, charitable organizations promise that each child will have only one sponsor. For example, Compassion International pledges that, 'The child you're helping has just one sponsor: you.' Why would a charitable organization make such a promise? A public good philanthropist would welcome the gifts of others. Charitable organizations seem to use sponsoring children as a means to assure donors that their contributions will have a large impact on the welfare of children.

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[20] www.savethechildren.org; www.christianity.com/feedthechildren; www.coc.org.au/global; www.compassion.com.

[21] Sponsoring is not limited to children. Donors can sponsor a variety of causes, such as cats and dogs at no-kill animal shelters.

While, on its face, sponsoring children is consistent with the goals of an impact philanthropist, it may also provide a way for any type of philanthropist to see exactly where his or her contribution goes. There are several reasons why a philanthropist might value the ability to monitor the activities of a charitable organization, the most obvious being an agency problem. However, sponsoring children creates a significant amount of overhead and is, therefore, a particularly expensive means of monitoring. Given the cost, why would charitable organizations and its donors choose sponsoring children as a means monitoring?

One reason a philanthropist might want to monitor a charitable organization is if he or she does not completely trust the organization. One difficulty with the agency explanation, however, is that charitable organizations and philanthropists seem to have the same objective: to help needy children. If so, what exactly is a philanthropist afraid the charitable organization will do with his or her donation? Of course, there is always the possibility of outright embezzlement; but if that were the case, outside audits would probably be a more efficient means of monitoring. In addition, charitable organizations with established reputations should be in a better position to earn the trust of donors and dispense with sponsoring arrangements, and yet, it is precisely the established and well-know charities that offer sponsoring.

Aside from embezzlement, a charitable organization might use a donation to cover startup costs or other operating expenses. If a philanthropist wants his or her contribution spent directly on children, then he or she may see that as a misappropriation. However, previous models of philanthropy do not explain why. If judicious spending on overhead maximizes the supply of the public good, then a public goods philanthropist would not object.[22] In fact, objecting to overhead is a symptom of impact philanthropy. That is, an impact philanthropist may not want to pay for something that benefits many recipients if it benefits each only a little. Thus, when a donor says, 'I want my donation to go directly to recipients,' he or she admits to being an impact philanthropist.

6.3. Conflict between charitable organizations and impact philanthropists

An impact philanthropist prefers to target his or her gift because targeting increases a gift's perceived impact. However, the goal of a charitable organization is not to benefit donors but to benefit its charitable cause. Although impact philanthropists and charitable organizations have similar goals—to maximize their respective impact—they will disagree on how to meet those goals.

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[22] Steinberg (1986) shows that they would not.

When raising money from a group of public good philanthropists, a charitable organization will encourage cooperation among donors because cooperation translates into greater contributions. Cooperation benefits the philanthropists, the recipients and the charitable organization. The same harmony does not exist between a charitable organization and impact philanthropists. While cooperation benefits impact philanthropists, it hurts recipients if it lowers total contributions. In addition, an impact philanthropist would not want to pay for overhead that benefits many recipients, but each only a little bit. The charitable organization, therefore, must balance its needs with the desires of its donors. As possible evidence of this balancing act, children's organizations historically have been accused of deceiving donors by secretly reallocating gifts, having multiple sponsors for the same children, and even having sponsored children who have moved to unknown locations or have died.[23] What is important to note is that children's organizations are rarely charged with acting against the best interests of the children, but only with deceiving its donors. Impact philanthropy explains why a charitable organization, attempting to maximize its total impact, would conflict with donors attempting to maximize their individual impacts.

7. Conclusion

An impact philanthropist is someone who values making a difference. Anyone for whom feeding one child is more satisfying than giving each of a thousand children a single grain of rice, or who wants his or her donation spent directly on a charitable cause rather than on overhead, has at least some impact philanthropy in them. In fact, there are many examples of contributors who display the symptoms of impact philanthropy. As mentioned, many donors prefer to sponsor a child rather than support a children's organization. Others prefer to give money directly to a homeless person rather than to a charity for the homeless. Many donors, and even some foundations, refuse to finance startup, administrative, or indirect costs, wanting their money to go directly to the cause they support. At Christmas, large families and groups of friends participate in 'white elephant' or 'secret Santa' gift exchanges in which each participant buys and receives one gift rather than buying gifts for everyone. In laboratory experiments, participants contribute less as group size decreases. While it may be possible to explain those examples with more complicated models—possibly including an agency problem or threshold production—this article shows that all that is necessary is the reasonable assumption that donors want their contributions to make a difference.

Although based on a reasonable assumption, the implications of impact philanthropy, in its purest form, lead to some seeming unphilanthropic behavior. When a philanthropist values 'making a difference,' he or she benefits, to some degree, from need. As a result, philanthropists and the recipients of philanthropy can fall into a codependent relationship in which both benefit from the other. In addition, cooperation among impact philanthropists can lead to less giving. Finally, charitable organizations can find themselves at odds with their donors, even if both have the same goal: to have a large impact on the supply of a good. For example, donors may be unwilling to pay for operating expenses that benefit many, if it benefits each only a little. Similarly, a fundraising policy that targets a donor's gift at a specific part of a production process will maximize the donors' perceived impact, but may not maximize the total supply of the charitable good.

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[23] The author in no way implies that any of the organizations mentioned in this article are guilty of, or have been accused of, deceiving their contributors in any way.

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Appendix A

Proof of Proposition 1

Define the function $\Phi(\lambda, G)$, such that:

$$\begin{aligned}\Phi(\lambda, G) \equiv & -U_i'(w_i + G - G_{-i}) + f_i'(\delta_i) Z'(e+G) \\ & + \lambda \sum_{k \neq i}^{n} f_k'(\delta_k)(Z'(e+G) - C'(e+G_{-k})).\end{aligned} \tag{A.1}$$

When $\lambda = 0$, (A.1) reduces to the first-order condition under voluntary contributions (15) and when $\lambda = 1$, (A.1) reduces to the first-order condition for a Pareto optimal allocation (17). $\Phi_\lambda < 0$, so $\mathrm{d}G/\mathrm{d}\lambda < 0$ by the implicit function theorem and thus, $G^* < G^s$. □

Proof of Proposition 2

Let $\boldsymbol{g}* = \{g_{ij}^*\}$ represent a Nash equilibrium gift allocation that solves (15) in which no two donors contribute to the same good. Evaluated at $\boldsymbol{g}*$, the second term on the right side of (17) is zero. The first-order conditions for a Nash equilibrium (15) and a Pareto optimal allocation (17) are equivalent. □

Proof of Proposition 3

Proposition 3 holds with heterogeneous donors provided that there are at least two donors and two goods, regardless of the ratio of donors to goods. It is not required that one donor give the same amount as others, only that each donor in the $\bar{\boldsymbol{g}}$ allocation spreads his or her total gift evenly across the goods. Comparing the donor's utility expresses by (14), $U_i(w_i - \sum_j \tilde{g}_{ij}) = U_i(w_i - \sum_j \bar{g}_{ij})$ by definition, and therefore, $\tilde{V}_i > \bar{V}_i$ if and only if $\tilde{\delta}_i > \bar{\delta}_i$. The opposite is also true. However, given the conditions of Proposition 3, $\bar{\delta}_i$ is the minimum possible impact that donor i can perceive. To establish that, rewrite donor i's impact as $\delta_i = \Psi - \sum_j Z_j(e_j + G_{-ij})$. The conditions of Proposition 3 imply that $\tilde{\Psi} = \bar{\Psi}$. Therefore, minimizing δ_i implies maximizing $\sum_j Z_j(e_j + G_{-ij})$. The maximization problem that satisfies the conditions of Proposition 3 and minimizes donor i's impact is:

$$\begin{aligned} &\max \ \sum_j Z(e + G_{-ij}) \\ &\text{s.t.} \ \sum_j g_{kj} = \sum_j \bar{g}_{kj} \ \forall k \neq i \end{aligned} \tag{A.2}$$

The maximization problem (A.2) minimizes i's impact with the constraint that every donor must give the same total gift as he or she did in the $\bar{\boldsymbol{g}}$ allocation. Once the other donors set their contributions, the conditions in Proposition 3 (i.e., that $\tilde{G}_j = \bar{G}_j \ \forall j$) determine donor i's contribution. Let $\delta_i^{\min}$ represent donor i's impact at the solution to (A.2). The first-order condition derived from (A.2) implies that the other donors contribute such that each good ends up with an equal marginal product *before* donor i contributes. Likewise, the conditions in Proposition 3 imply that every good ends up with equal marginal product *after* donor i contributes. Therefore, donor i's finds him or herself in a situation identical to the $\bar{\boldsymbol{g}}$ allocation, and $\delta_i^{\min} = \bar{\delta}_i$. Therefore, it must be the case that $\tilde{\delta}_i \geq \bar{\delta}_i \ \forall i$ and $\tilde{V}_i \geq \bar{V}_i \ \forall i$. The only restrictions on $\tilde{\boldsymbol{g}}$ are those stated in Proposition 3, and so, it is possible that $\tilde{\delta}_i = \bar{\delta}_i$ for some i. However, it is not possible that $\tilde{\delta}_i = \bar{\delta}_i$ for all i because then $\tilde{\boldsymbol{g}}$ and $\bar{\boldsymbol{g}}$ would be the same allocation. For the $\tilde{\boldsymbol{g}}$ allocation to be different than $\bar{\boldsymbol{g}}$, at least two donors must spread their contributions unevenly across the goods. For the donors who spread their gifts unevenly across the goods, $\tilde{\delta}_i$ cannot be a minimum because, by definition, the other donors do not leave the goods with equal marginal products. Therefore, while $\tilde{\delta}_i \geq \bar{\delta}_i$ for all donors, it must also be true that $\tilde{\delta}_i > \bar{\delta}_i$ for at least two donors and thus $\tilde{V}_i > \bar{V}_i$ for at least two donors. Some donors are better off in the $\tilde{\boldsymbol{g}}$ allocation with no donor being worse off.[24] □

Proof of Proposition 4

As with Proposition 3, Proposition 4 holds with heterogeneous donors and regardless of the ratio of donors to goods. Let $\tilde{\boldsymbol{g}} = \{\tilde{g}_{ij}\}$ represent a gift allocation different from $\bar{\boldsymbol{g}}*$, but where $\sum_j \tilde{G}_j = \sum_j \bar{G}_j$. By (16), $\tilde{\boldsymbol{g}}$ must equate the marginal product of each good, and so $\tilde{G}_j = \bar{G}_j* \ \forall j$. The fact that each good must receive the same total gift in both allocations does not imply that each donor must give the same gift, either to each good or in total. However, it does imply that either $\sum_j \tilde{g}_{ij} = \sum_j \bar{g}_{ij} \ \forall i$ or that $\sum_j \tilde{g}_{ij} > \sum_j \bar{g}_{ij}$ for some i. If every donor gives the same total gift in $\tilde{\boldsymbol{g}}$ as in $\bar{\boldsymbol{g}}*$, and the two allocations are different, then Proposition 3 implies that $\tilde{\delta}_i > \bar{\delta}_i*$ for some i. However, the Nash first-order condition (15) cannot be met for donors where $\tilde{\delta}_i > \bar{\delta}_i*$, and therefore, $\tilde{\boldsymbol{g}}$ is not a Nash equilibrium. On the other hand, if some donors give more in $\tilde{\boldsymbol{g}}$ than in $\bar{\boldsymbol{g}}*$, then others must give less. Thus, if the amount given by donor i is greater in $\tilde{\boldsymbol{g}}$ than in $\bar{\boldsymbol{g}}*$, then the total given by donors other than i must be smaller in $\tilde{\boldsymbol{g}}$ than in $\bar{\boldsymbol{g}}*$. Using the same logic that establishes Proposition 3, it must be that $\tilde{\delta}_i > \bar{\delta}_i*$ for any donor who gives more. However, (15) cannot hold for donors who give more in $\tilde{\boldsymbol{g}}$ than in $\bar{\boldsymbol{g}}*$ and, therefore, $\tilde{\boldsymbol{g}}$ cannot be a Nash equilibrium. □

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[24] Proposition 3 does not impose boundary conditions on the $\tilde{\boldsymbol{g}}$ allocation. Any $\tilde{\boldsymbol{g}}$ allocation is Pareto superior to $\bar{\boldsymbol{g}}$, including ones in which some donors give negative gifts to specific goods. A donor cannot take money away from every good because the total gift he or she gives must be the same in $\tilde{\boldsymbol{g}}$ and $\bar{\boldsymbol{g}}$. However, that does not rule out one donor taking away one good's endowed wealth and giving it to another good, provided that another donor offsets the first donor's action by making an offsetting transfer. While Proposition 3 does not rule out negative transfers, they are ruled out in the analysis follows Proposition 3.

Proof of Proposition 5

Let J_i represent the set of λ goods that i may contribute to when contributions are targeted. Gifts are targeted such that $J_k \cap J_l$ is an empty set $\forall k \neq l$. When donor i can contribute only to goods in J_i, his or her utility is:

$$V_i = U\left(w - \sum_j g_{ij}\right) + f(\delta_i), \tag{A.3}$$

where $\delta_i = \sum_{j \in J_i}(Z_j(e + G_j) - Z_j(e))$. The first-order condition for an interior solution to choosing the gifts that maximize (A.3) is:

$$U'\left(w - \sum_j g_{ij}\right) = f'(\delta_i)Z_j'\ (e + G_j), \quad \forall j \in J_i. \tag{A.4}$$

Initially, suppose that each donor gives the same total gift in the targeted allocation ($\boldsymbol{g}^s$) as he or she did in the spreading gifts around allocation ($\bar{\boldsymbol{g}}*$). Giving the same total gift cannot solve (A.4), given that it solved (15), because while the left side and the last term on the right side of (A.4) are identical to their counterparts in (15), the first term on the right side of (A.4)—person i's marginal impact—is smaller than it is in (15). Thus, the only way to satisfy (A.4) is for contributions to fall, meaning that total contributions will be lower at the targeted equilibrium. On the other hand, evaluated at the targeted gift allocation ($\boldsymbol{g}^s$), (A.4) and (15) are equivalent. That is, when contributions are divided equally among the children, the equilibrium allocation solves (15) but not (A.4). However, when contributions are targeted, the equilibrium allocation solves both (15) and (A.4). Thus, at $\boldsymbol{g}^s$, donor i has no incentive to cheat by contributing to a good not contained in J_i. Furthermore, the targeted gift allocation ($\boldsymbol{g}^s$) has no two donors contribute to the good, and so by Proposition 2, it is Pareto optimal for donors. □

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